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(54) Printing plate production

(57) A printing plate 1 or printing plate proof contains, in addition to the area 6 containing the image to be printed, two areas 7 and 8 containing a code indicative of plate calibration information in digitised form, and two areas 9 and 10 containing a code indicative of plate image management (PIM) information in digitised form. The PIM information and plate calibration information is in the form of bar-coded data which may be read by a scanner in order to effect automatic calibration of the printing press and control of the printing process in dependence on the read PIM information. The PIM information may be in the form of a strip consisting of a series of tags each of which contains information about one aspect of the plate image management, such as job, screening, registration, ink coverage, etc.

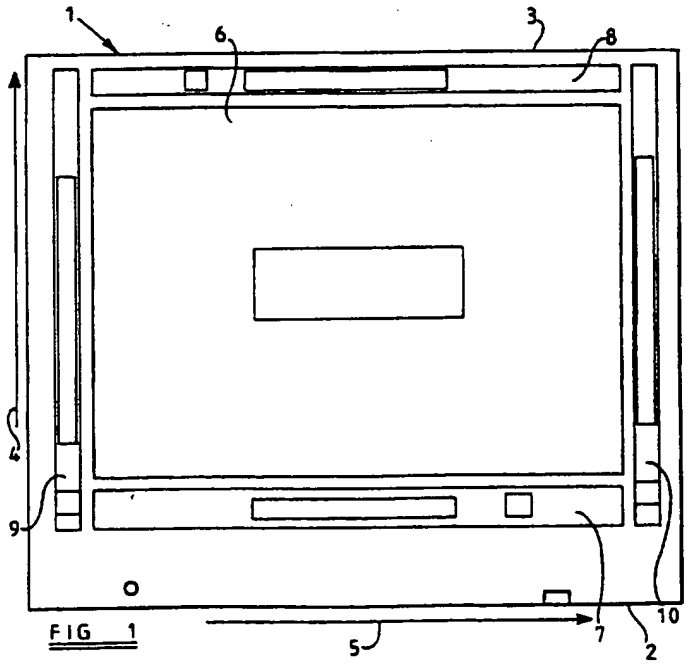

FIG 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1995

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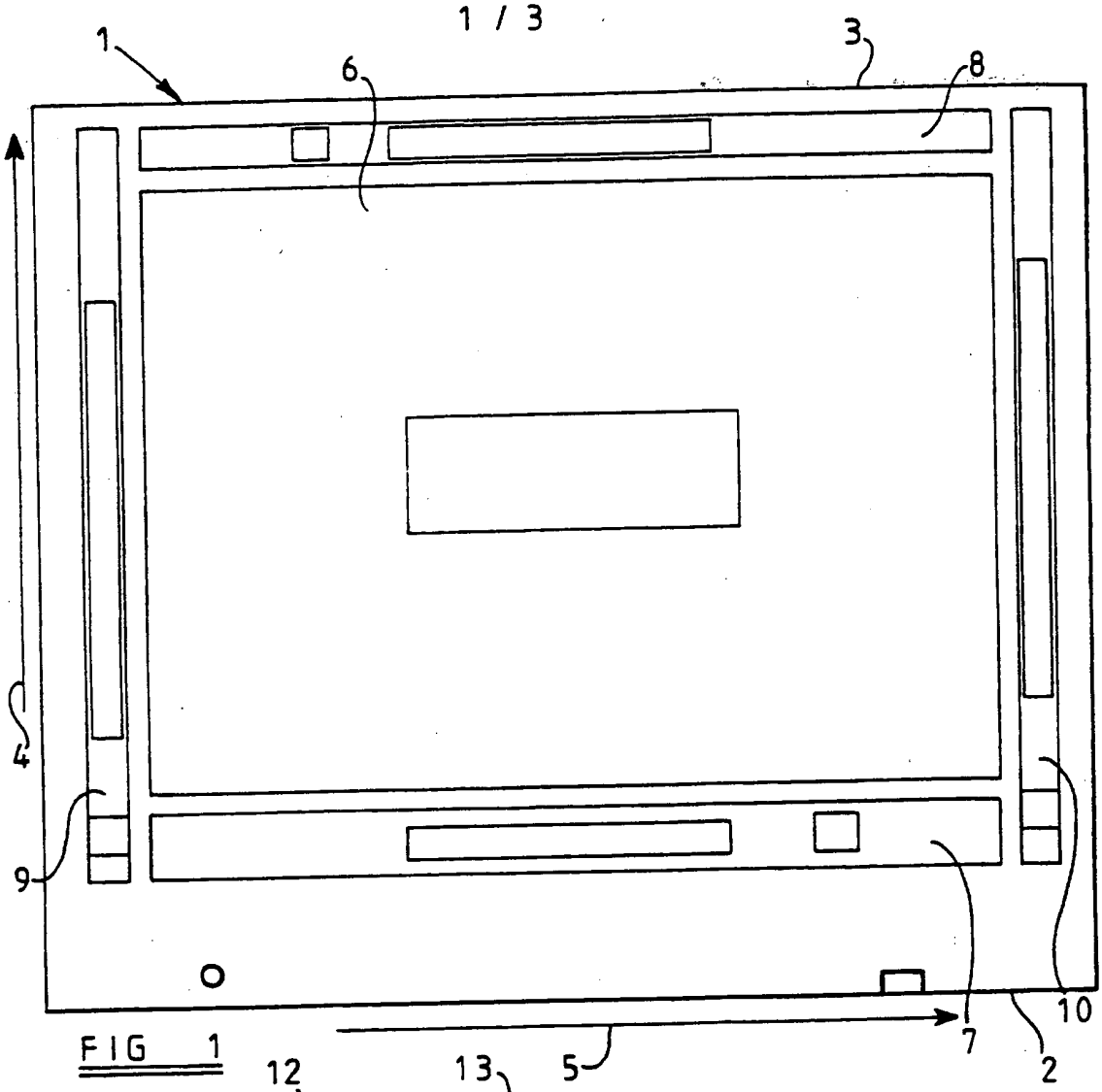
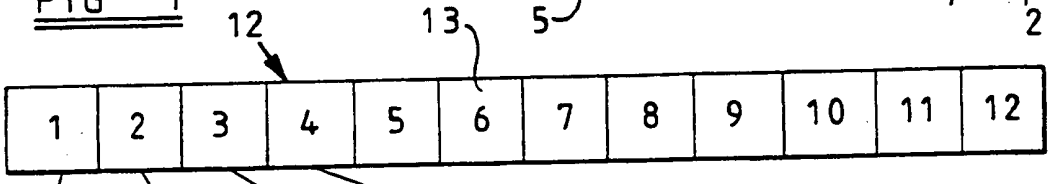


FIG 1



TAG 1 contains information about	TAG 2 contains information about	TAG 3 contains information about	TAG 4 contains information about	TAG 5 contains information about
Job name	Job size	Screening type	Registration type	Ink coverage
date	separation	resolution		number of ducts
reference	plot resolution	angle		duct size
TAG pointer	type	dot shape		TAG pointer

FIG 2

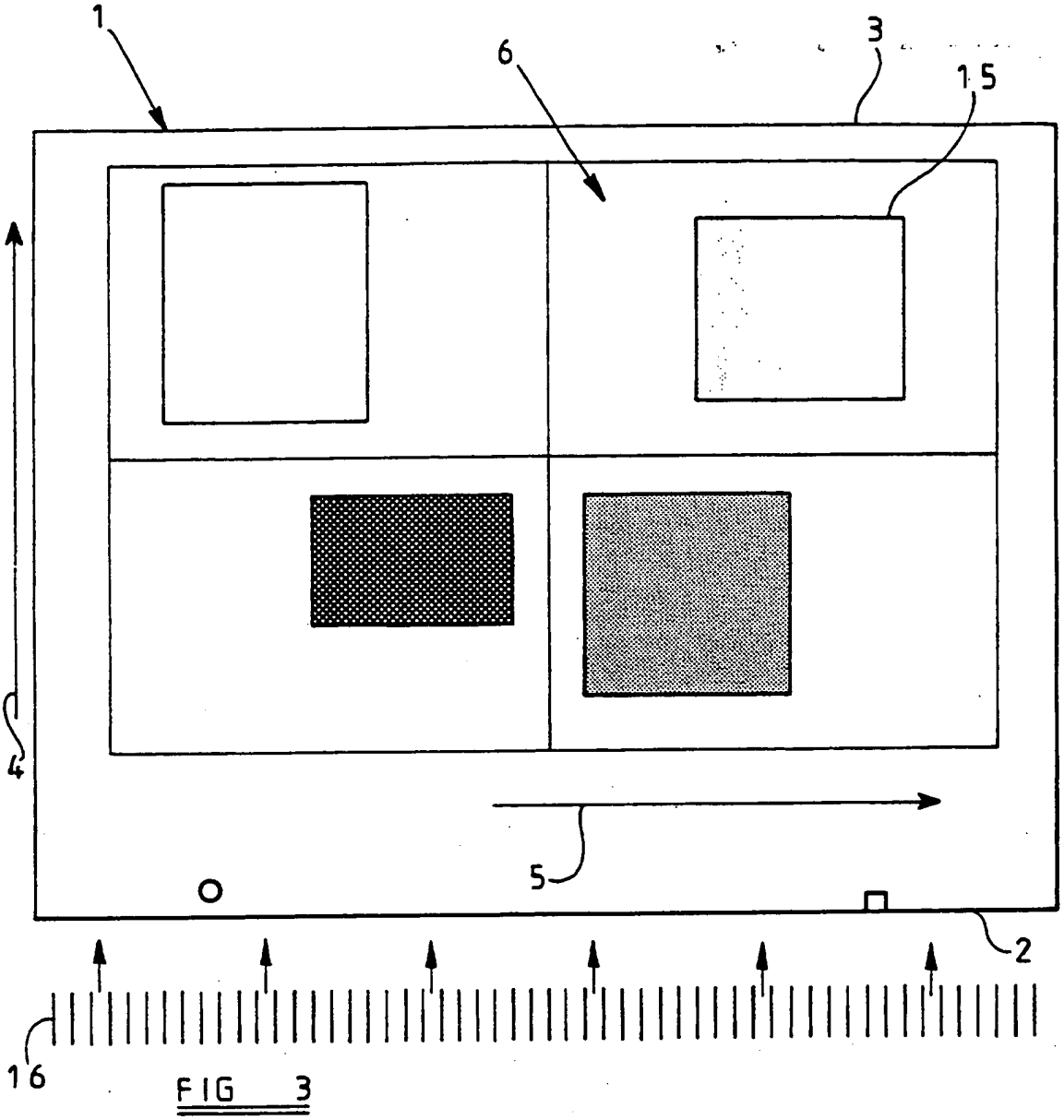


FIG 3

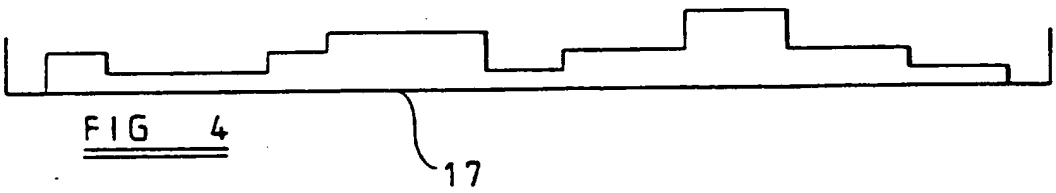


FIG 4

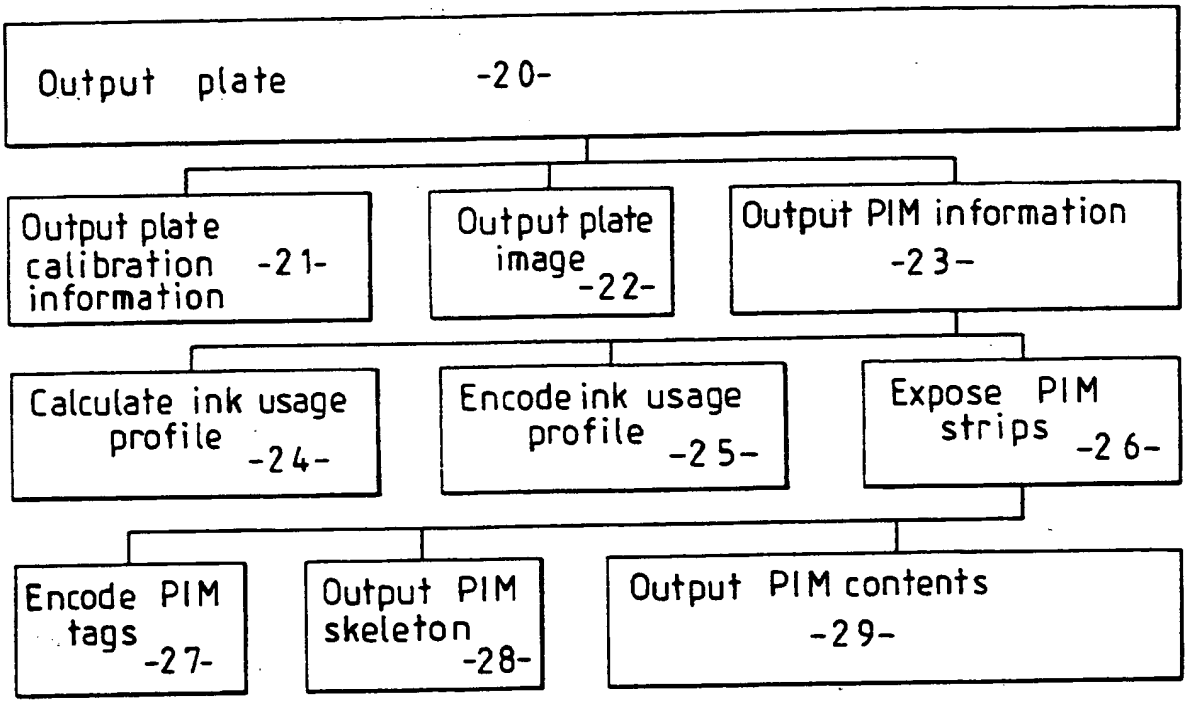


FIG 5

"Printing Plate Production"

This invention relates to the production of printing plates, as well as to the printing plates so produced and to the printing of images utilizing such printing plates.

The advent of direct-to-plate technology permits the direct application of an image to a substrate to produce a printing plate utilizing a suitable digital imaging device controlled by digital data representative of the image. This avoids the need for a film containing the image to first be produced by an imaging device, and for the image to be applied to the substrate in a subsequent process in which the substrate is exposed to a light source utilizing the film as a mask. Direct-to-plate technology thus enables printing plates to be produced more economically and quickly, as well as enabling higher definition images to be printed.

In conventional plate-making systems, the printing plate may include various extra information in addition to the image to be printed, such as marks for assisting the set-up and calibration of the printing press with which the image is to be printed. However such set-up and calibration marks are independent of the form of the image to be printed and are used only in the initial set-up procedures.

It is an object of the invention to provide an improved plate-making system enabling improved control of the printing process.

According to the present invention there is provided a system for producing

a printing plate or printing plate proof which comprises first control means for applying an image to be printed to an image area of a substrate by means of a digital imaging device, and second control means for applying a code to a plate image management area of the substrate by means of the digital imaging device, the code being indicative of plate image management information for controlling printing of the image.

The plate image management (PIM) information may contain data about the image or job to be printed, such as the distribution of ink coverage or the positioning of registration marks which are used for registering the images on a series of plates for printing of different colours. Such PIM information will typically be used to set up and control the printing press, either directly or indirectly. In other words, the PIM code can be read by an operator directly from the printing plate or proof so that the operator can then manually carry out the corresponding set-up and control procedures, or alternatively the PIM code can be read by a machine, such as a bar code scanner so that the PIM information can then be interpreted by a computer programme in order to effect the set-up and control of the printing press either automatically or by displaying the information so that the operator can then manually carry out the set-up and control procedures. Such PIM information both reduces the time required for setting up the printing press and removes or reduces the need for a skilled operator to effect the set-up and control of the printing process utilizing judgment gained by experience, as well as enabling more precise control of the printing process to obtain superior results and reducing the quantity of paper and ink used.

The PIM code may be read by the operator or machine either from the printing plate itself or from a printing plate proof prepared for the purpose of proofing (the printing plate itself being produced after such proofing has been completed). As a further alternative the PIM code may be read from a proof sheet printed by means of the printing plate.

The printing plate production system may be encoded in the form of a computer program for controlling application of the image and the code indicative of the plate image management information to the substrate by the digital imaging device.

Furthermore the encoded plate management information is preferably dependent on the image to be printed. For example the information may serve to indicate the amount of ink to be applied to each part of the printing plate in dependence on the degree of inking required by the form of the image on that part of the plate.

The second control means is preferably arranged to apply the code indicative of plate image management information to the substrate in dependence on data dependent on the image to be printed supplied by the first control means.

The second control means may be adapted to apply the code indicative of the plate image management information to the substrate in the form of a series of code elements each of which is adapted to control an associated plate image

management function during printing. The code elements may take the form of distinct tags which are adapted to be machine-readable or human-readable, or alternatively such elements may be encoded in such a manner that there is no direct relationship between the physical layout of the code and the constituent elements of the code. Thus the code may, for example, be in the form of a checkerboard bar code in which the information is encoded in the form of a digital data stream.

The invention further provides a method of producing a printing plate or printing plate proof which comprises applying an image to be printed to an image area of a substrate by means of a digital imaging device, and applying a code indicative of plate image management information for controlling printing of the image to a plate image management area of the substrate by means of the digital imaging device. The substrate may be the printing plate itself or a printing plate proof or even a proof sheet printed by the printing plate.

According to the present invention there is also provided a printing plate or printing plate proof comprising an image area containing the image to be printed which has been applied to the plate or proof by a digital imaging device, and a plate image management area containing a code indicative of plate image management information for controlling printing of the image which has also been applied to the plate or proof by the digital imaging device.

The invention also provides a method of printing which comprises printing an image utilizing a printing plate or a printing plate proof incorporating an image

area containing the image to be printed which has been applied to the plate or proof by a digital imaging device, and controlling printing of the image utilizing plate image management information as indicated by a code which has been applied to a plate image management area of the plate or proof by the digital imaging device.

In order that the invention may be more fully understood, reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 shows a printing plate in accordance with the invention;

Figure 2 diagrammatically shows a PIM information strip as provided on such a printing plate;

Figure 3 shows an example of an image to be inked on such a printing plate;

Figure 4 shows an ink profile corresponding to the image to be inked of Figure 3; and

Figure 5 is a block diagram illustrating the overall control of the data to be applied to the printing plate.

The printing plate 1 shown in Figure 1 has a front grip edge 2 and a back edge 3, and is produced by exposing a substrate utilizing a per se known laser imaging device to scan the substrate with a laser beam controlled by digital data so as to produce the image to be printed. The laser imaging device builds up the image in known manner with a scan line direction indicated by the arrow 4 in Figure 1 and a traverse direction indicated by the arrow 5.

In addition to the area 6 containing the image to be printed, the plate 1 contains two areas 7 and 8 containing a code indicative of plate calibration information in digitised form, and two areas 9 and 10 containing a code indicative of plate image management (PIM) information in digitised form. The PIM information and plate calibration information may be bar-coded data which may be read by a scanner in order to effect automatic calibration of the printing press and control of the printing process in dependence on the read PIM information, as will be described in more detail below. The number of areas containing PIM information and plate calibration information may be varied, and in addition the positioning of such areas on the plate may be varied, in dependence on the particular control system used. In some cases the PIM information will be calculated as the plate is exposed, and therefore will not be fully available until the exposure is complete. In this case, the PIM information will generally be provided on the extreme edge of the plate outside the area containing the image.

As shown diagrammatically in Figure 2, the PIM information is contained in a strip 12 consisting of a series of tags 13 in the form of bar-coded data in machine-readable form. Each of the tags 13 contains information about one aspect of the plate image management, and each tag is self-contained in that the exercise of the corresponding plate image management function is not dependent on any one of the other tags. The writing of the PIM information on the plate is open-ended in that the number of tags is variable and the choice of tags provided depends on the ability of the system to collate the relevant information. The scheme is intended to be flexible so that new tags describing new aspects of the plate image management can

easily be added. If required the plate image management information associated with a particular tag can be extended by reference to a continuation tag.

There is set out below an illustrative example of the information coded in a series of tags provided in a PIM information strip.

TAG1	JOB DESCRIPTION	
	Field 1	Job name / Job ID
	Field 2	Date code
	Field 3	free
	:	
	:	
	Field n	Continuation TAG number
TAG2	JOB FORMAT	
	Field 1	Units mm.ins
	Field 2	Job size
	Field 3	Plotting resolution
	Field 4	Separation Colour
	:	
	:	
	Field n	Continuation TAG number
TAG3	SCREEN FORMAT	
	Field 1	
	Field 2	
	Field 3	
	Field 4	
	:	
	:	
	Field n	Continuation TAG number
TAG4	REGISTRATION FORMAT	
	Field 1	
	Field 2	
	Field 3	
	Field 4	
	:	
	:	
	Field n	Continuation TAG number
TAG5	INK COVERAGE SET-UP	
	Field 1	
	Field 2	

Field 3
Field 4
:
:
Field n Continuation TAG number

TAG6 INK COVERAGE DUCT VALUES
Field 1
Field 2
Field 3
Field 4
:
:
Field n Continuation TAG number

TAG7 INK COVERAGE DUCT VALUES
Field 1
Field 2
Field 3
Field 4
:
:
Field n Continuation TAG number

In the above example, the ink coverage set-up information contained in TAG 5 may describe the type of information contained in TAG 6 and TAG 7 which contain ink coverage duct values corresponding to the number of ink ducts provided on the printing press with which the printing plate is to be used.

A practical example of the manner in which PIM information encoded in a PIM information strip may be utilised to control one aspect of plate image management will now be described with reference to Figures 3 and 4 which diagrammatically show the control of the amount of ink to be applied to the plate to print the image in dependence on the encoded PIM information applied to the plate during exposure.

Figure 3 shows areas 15 of varying densities within the image area 6 on the plate 1 for which different amounts of ink are required for printing. Furthermore ink ducts 16 are shown adjacent the front grip edge 2 of the plate 1 for controlling the flow of ink onto the plate during printing.

Figure 4 shows an ink profile 17 for the image area in which the height is proportional to the amount of ink required in the corresponding scan line. The ink profile can be built up by counting the number of inked or non-inked pixels along the scan line, and this profile can then be encoded and utilised to apply corresponding PIM information to the plate during exposure so that the PIM information is representative of the amount of ink required for each scan line, and this PIM information when read can be used to appropriately control the ink ducts 16 on the printing press during printing to apply only the required amounts of ink to each part of the plate. It will be appreciated that this PIM information representative of the amount of ink required during printing is directly dependent on the image to be printed in that the coded information is produced by reference to the density distribution of the image.

The block diagram of Figure 5 shows, in schematic form, the manner in which the data is applied to the printing plate under software control. The plate data output at 20 is divided into (i) plate calibration information data output at 21, (ii) plate image data output at 22, and (iii) PIM information data output at 23. The encoding of the plate image data and plate calibration information data may be carried out in conventional manner, and accordingly further analysis of the PIM information

data only is provided in Figure 5. In the process of encoding the PIM information an ink usage profile is calculated at 24 by analysis of the image data, and the resulting profile is encoded at 25 and, together with further PIM information similarly encoded, is incorporated in the data for exposing the PIM strips at 26. As previously indicated the PIM strips may consist of a series of tags 27 in the form of bar-coded data in machine-readable form (or alternatively a series of human-readable tags), such tags incorporating the PIM skeleton 28 incorporating clocking pulses and simple parity check bits, for example, and the PIM contents 29 for effecting control of the printing process.

CLAIMS

1. A system for producing a printing plate or printing plate proof which comprises first control means for applying an image to be printed to an image area of a substrate by means of a digital imaging device, and second control means for applying a code to a plate image management area of the substrate by means of the digital imaging device, the code being indicative of plate image management information for controlling printing of the image.

2. A system according to claim 1, wherein the plate image management information contains data about the image or job to be printed, such as the distribution of ink coverage or the positioning of registration marks used for registering images on a series of plates for printing of different colours.

3. A system according to claim 1 or 2, which is be encoded in the form of a computer program for controlling application of the image and the code indicative of the plate image management information to the substrate by the digital imaging device.

4. A system according to any preceding claim, wherein the encoded plate management information is dependent on the image to be printed.

5. A system according to claim 4, wherein the encoded plate management information is adapted to indicate the amount of ink to be applied to each part of the

printing plate in dependence on the degree of inking required by the form of the image on that part of the plate.

6. A system according to any preceding claim, wherein the second control means is arranged to apply the code indicative of plate image management information to the substrate in dependence on data dependent on the image to be printed supplied by the first control means.

7. A system according to any preceding claim, wherein the second control means is adapted to apply the code indicative of the plate image management information to the substrate in the form of a series of code elements each of which is adapted to control an associated plate image management function during printing.

8. A system according to claim 7, wherein the code elements take the form of distinct tags which are adapted to be machine-readable or human-readable.

9. A system according to any preceding claim, wherein the code is in the form of a checkerboard bar code in which the information is encoded in the form of a digital data stream.

10. A method of producing a printing plate or printing plate proof which comprises applying an image to be printed to an image area of a substrate by means of a digital imaging device, and applying a code indicative of plate image management information for controlling printing of the image to a plate image

management area of the substrate by means of the digital imaging device.

11. A printing plate or printing plate proof comprising an image area containing the image to be printed which has been applied to the plate or proof by a digital imaging device, and a plate image management area containing a code indicative of plate image management information for controlling printing of the image which has also been applied to the plate or proof by the digital imaging device.

12. A method of printing which comprises printing an image utilizing a printing plate or a printing plate proof incorporating an image area containing the image to be printed which has been applied to the plate or proof by a digital imaging device, and controlling printing of the image utilizing plate image management information as indicated by a code which has been applied to a plate image management area of the plate or proof by the digital imaging device.

13. A system for producing a printing plate or printing plate proof substantially as hereinbefore described with reference to the accompanying drawings.

14. A method of producing a printing plate or printing plate proof substantially as hereinbefore described with reference to the accompanying drawings.

15. A printing plate or printing plate proof substantially as hereinbefore described with reference to the accompanying drawings.

16. A method of printing substantially as hereinbefore described with reference to the accompanying drawings.

The Patent Office

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Application No: GB 9505264.3
Claims searched: 1-16

Examiner: John Coules
Date of search: 4 June 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): H4F FFN,FFS,FFX

Int Cl (Ed.6): H04N 1/00; B41F 33/00

Other: Online: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
	NONE	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.